Cut, Copy, and Paste on the iPhone

Session 105

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Cut, Copy, and Paste on the iPhone

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Editing and Sharing Your Data

- Display the edit control
- Specify which actions are available
- Share your data using the pasteboard
- Add undo to your application

New Features

- Menu controller
- Responders
- Pasteboard
- Undo manager

Menu Controller

Menu Controller

- Provides access to edit interface
- Single shared instance
- Position and show the control
- Enable items

Showing the Menu

- Use -setMenuVisible:animated:
- Trigger on ‘press-and-hold’ gesture

Positioning the Menu

- Use -setTargetRect:inView:
- targetRect can be zero width or height
- Doesn’t track changes to view location
- Set while visible to move

Example

```
- (void)touchesEnded:(NSSet *)touches withEvent:(UIEvent *)event {
    for (UITouch *touch in touches) {
      if ([self pointInside:[touch locationInView:self] withEvent:event]) {
        [self becomeFirstResponder];
        if (event.timestamp > beganTimestamp + HOLD_TIME) {
            UIMenuController *controller = [UIMenuController sharedController];
            [controller setTargetRect:self.bounds inView:self];
            [controller setMenuVisible:YES animated:YES];
        }
        break;
      }
    }
}
```

Hiding the Menu

- Automatically hidden
  - Touch begins in another view
  - Alert appears
  - Application deactivates
- Hide via -setMenuVisible:animated: or UIMenuController.menuVisible
- Listen for UIMenuControllerWillHideMenuNotification

Menu Interface

- Automatically localized
- *Not* customizable
  - *Fixed* item names
  - *No* additional items
  - *Don't* even try

Responders

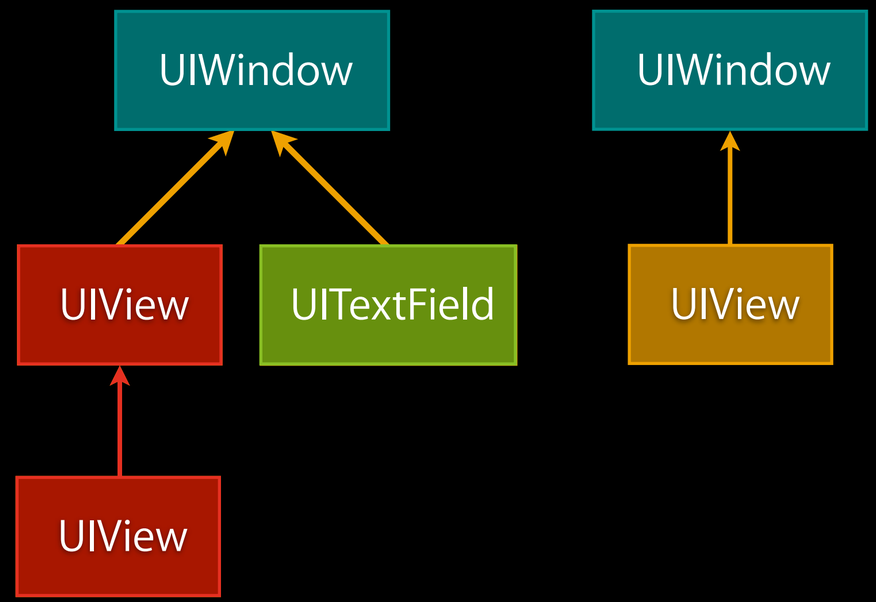
Responders

In 2.x

- Only for passing touch events from view to superview
- UIApplication.keyWindow not used
- Only UITextField and UITextView became first responder

Responders

In 2.x



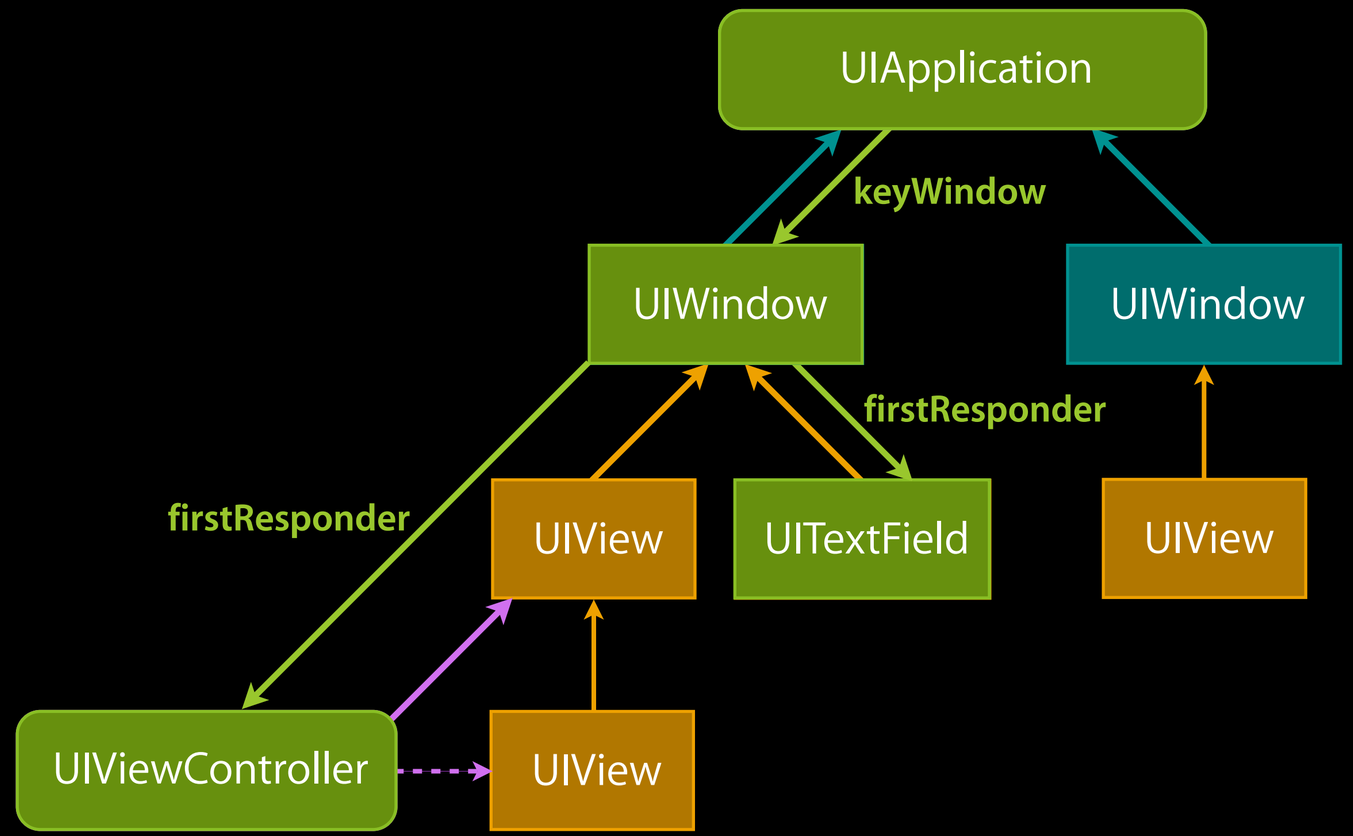
Responders

In 3.0

- UIApplication.keyWindow is used
  - -[UIWindow makeKeyAndVisible]
  - UIWindow.keyWindow
- Used for menu action validation and handling
- Be key window and first responder aware

Responders

In 3.0



Responders

- UIView, UIViewController and UIApplication are UIResponders
- Chained using -nextResponder
  - Read-only property
  - Subclass to return custom next responder
- Each UIWindow has a first responder

Becoming the First Responder

- -canBecomeFirstResponder
  - Read-only property defaults to NO
  - Subclass to return YES
- Call -becomeFirstResponder
- Override -becomeFirstResponder and -resignFirstResponder to show feedback
- Must be in a window to become the first responder

Becoming the First Responder

- With a view

```
- (void)touchesEnded:(NSSet *)touches withEvent:(UIEvent *)event {
    for (UITouch *touch in touches) {
      if ([self pointInside:[touch locationInView:self] withEvent:event]) {
        [self becomeFirstResponder];
        ...
        break;
      }
    }
}
```

Becoming the First Responder

- With a view controller

```
- (void)viewDidAppear:(BOOL)animated {
  [super viewDidAppear:animated];
  [self becomeFirstResponder];
}
```

Responders Coming and Going

- UITextField and UITextView
  - Become first responder on touch
- Listen for resigning first responder using
  - -textFieldDidEndEditing:
  - UITextFieldTextDidEndEditingNotification

Responder Actions

- Predefined system editing actions

```
- (void)cut:(id)sender;
- (void)copy:(id)sender;
- (void)paste:(id)sender;
- (void)select:(id)sender;
- (void)selectAll:(id)sender;
```

Enabling Actions

- Implementing the action
  - Always enabled
  - Standard actions are not implemented by UIResponder
- Add -[UIResponder canPerformAction:withSender:]
  - Customize when the action is available
  - Called for every action
  - Always pass unknown actions to super

Enabling Actions

```
- (void)canPerformAction:(SEL)action withSender:(id)sender {
  if (action == @selector(cut:)) {
    return NO;
  } else if (action == @selector(copy:)) {
    return self.selectedCount > 0;
  } else if (action == @selector(paste:)) {
    return NO;
  } else if (action == @selector(select:)) {
    return NO;
  } else if (action == @selector(selectAll:)) {
    return self.itemCount > 0;
  } else {
    return [super canPerformAction:action withSender:sender];
  }
}
```

Demo

Pasteboard

Pasteboard

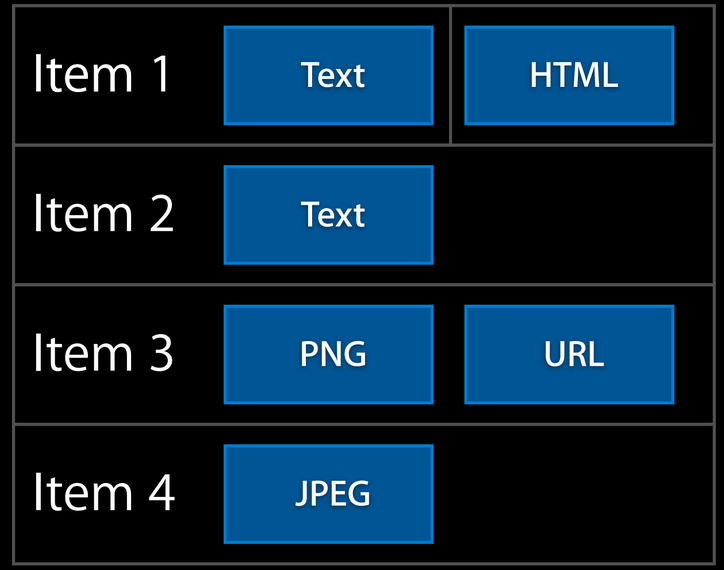
- Shared and persistent storage
- Single or multiple items
- Multiple representations per item
- Standard pasteboard

Getting a Pasteboard

- Get the system pasteboard
  - +generalPasteboard
- Get or create named pasteboards
  - +pasteboardWithName:create:
  - +pasteboardWithUniqueName
- Pasteboards are owned by the application that created them

Pasteboard Items

- Single item
- Multiple, unique representations per item
- Multiple items



Pasteboard Data

- All information stored as NSData
  - -dataForPasteboardType:
- Can use property list objects
  - -valueForPasteboardType:
    - NSDictionary, NSArray, NSDate, NSString, NSNumber, NSData

Pasteboard Contents

- Check if type is on pasteboard
  - -containsPasteboardTypes:
- Or ask for a list if order is important
  - -pasteboardTypes

Single Pasteboard Item Methods

- Operates on first item only

```
- (NSArray *)pasteboardTypes
- (BOOL)containsPasteboardTypes:
- (NSData *)dataForPasteboardType:
- (void)setData:forPasteboardType:
- (id)valueForPasteboardType:
- (void)setValue:forPasteboardType:
```

- Setting will replace all items

Multiple Items

- Same methods as single item
  - Adds UIPasteboard.numberOfItems
- Use NSIndexSet to specify items of interest
- Returns array instead of single item

```
-(NSData *)dataForPasteboardType:(NSString*)pbType
-(NSArray *)dataForPasteboardType:(NSString *)pbType inItemSet:(NSIndexSet *)set;
```

- Direct access via UIPasteboard.items and -[UIPasteboard addItems:]
  - UIPasteboard.items returns everything
  - Can use multiple items methods after setting single item

Persistence

- Application pasteboards are not persistent
  - Removed when application exits
- Setting persistence flag will keep pasteboard around
  - Do not use as general storage
  - Not guaranteed to be around after reboot
- Owner can call +removePasteboardWithName:

Predefined Pasteboard Types

- Strings, images, URLs, colors

```
[UIPasteboard generalPasteboard].string = @"Hello, World!";
```

- Single and multiple item properties

```
[UIPasteboard generalPasteboard].strings
          = [NSArray arrayWithObjects:@"Hello", @"World!", nil];
```

- Setter clears all existing items
- Images are converted to PNG
  - Use original image data if possible
  - Can be noticeably slow

UTIs

- Use UTIs (“Universal Type Identifiers”)
  - kUTTypePNG, kUTTypeMP3, kUTTypeURL
- UIPasteboard type lists
  - UIPasteboardTypeListImage = kUTTypePNG, kUTTypeTIFF, kUTTypeJPEG, kUTTypeGIF
- Same API as Mac OS X
- Located in MobileCoreServices.framework

Pasteboard Do's and Don'ts

- Do add multiple representations
- Don't use for storage
- Do use original image data
- Don't put secure data on the general pasteboard

Demo

Undo

Undo

- Mac OS X NSUndoManager
- Register undo action when user makes a change
- The undo manager
  - Keeps stack of actions
  - Plays back actions
  - Group actions together
  - Keeps track of action name

Creating an Undo Action

- With target/selector
  - -[NSUndoManager registerUndoWithTarget:selector:object:]
- With invocation
  - -[NSUndoManager prepareWithInvocationTarget:]

Undo Action with Target/Selector

- Use target/action with
  - Reversible setter
  - Undo method that takes a single NSObject

```
- (void)setColor:(UIColor *)color {
    if (![color isEqual:_color]) {
        NSUndoManager *undoManager = [self undoManager];
        [undoManager registerUndoWithTarget:self
                                   selector:@selector(setColor:)
                                     object:_color];
        [_color release];
        _color = [color retain];
        [self update]
    }
}
```

Undo Action with Invocation

- Use invocation with
  - Non-NSObject parameters
  - Multiple parameters

```
- (void)setLevel:(NSInteger)level {
    if (level != _level) {
        NSUndoManager *undoManager = [self undoManager];
        [[undoManager prepareWithInvocationTarget:self] setLevel:_level];
        _level = level;
        [self update];
    }
}
```

Undo Title

- Set the name when you register the action

```
- (void)setColor:(UIColor *)color {
    if (![color isEqual:_color]) {
        NSUndoManager *undoManager = [self undoManager];
        [undoManager registerUndoWithTarget:self
                                   selector:@selector(setColor:)
                                     object:_color];
        [undoManager setActionName:@"Set Color"];
        …
    }
}
```

Managing Undo State

- Nesting undo actions
  - Default is to group for a single event
  - Combine same actions across events
    - -beginUndoGrouping/-endUndoGrouping
- Clear undo stack
  - -removeAllActions
  - -removeAllActionsForTarget:

Enabling Undo

- Automatically get ‘shake to undo’
  - Alert shows only if there is something to undo
- Turn off via property
  UIApplication.applicationSupportsShakeToEdit
- Always get motion events
- UIApplication must receive motion events to enable undo

Undo Managers

- Shared undo managers
  - Searches up responder chain
  - Each window has one
- Special undo managers
  - UITextField
  - NSManagedObjectContext in CoreData
- Provide your own for ‘modal’ undo

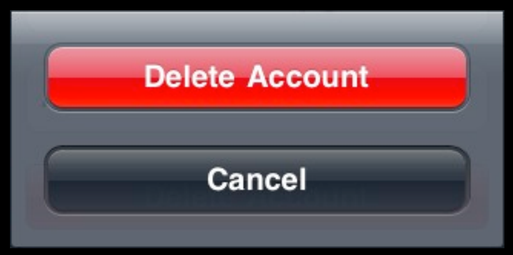
Undo Interface

- Undo should have visible effect
  - Don’t undo offstage
  - Show selection
  - Use animation
- Clear undo stack when leaving
- Undo and Redo toolbar buttons

When Not to Undo

- Don’t use undo for large scale actions
- Use a two stage confirmation
  - Minus button + delete button in table view

  - Delete button + action sheet



Demo

More Information

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Documentation
UIKit Reference
http://developer.apple.com/iphone

Related Sessions

Effective iPhone App Architecture	Presidio Thursday 3:30PM
iPhone View Controller Techniques	Presidio Thursday 5:00PM
What's New in Cocoa Touch	Pacific Heights Tuesday 10:30AM
iPhone Views and Animations	Pacific Heights Tuesday 3:30PM

Labs

iPhone Cut, Copy, and Paste Lab	iPhone Lab C Wednesday 5:00PM
iPhone View Controllers Lab	iPhone Lab A Friday 9:00AM

Summary

- Cut, Copy, and Paste let your users edit data
- The pasteboard lets your users share data
- Undo helps your users fix their mistakes
- Enhances your application's value

Q&A

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